

What is claimed is:

1 1. A thermal barrier coating composition comprising 46-97 molar
2 percent base oxide, 2-25 molar percent primary stabilizer, 0.5-
3 25 molar percent group A dopant, and 0.5-25 molar percent group
4 B dopant, said base oxide being selected from the group
5 consisting of ZrO_2 , HfO_2 and combinations thereof, said primary
6 stabilizer being selected from the group consisting of Y_2O_3 ,
7 Dy_2O_3 , and Er_2O_3 and combinations thereof, said group A dopant
8 being selected from the group consisting of rare earth oxides,
9 alkaline earth metal oxides, transition metal oxides and
10 combinations thereof, and said group B dopant being selected
11 from the group consisting of Nd_2O_3 , Sm_2O_3 , Gd_2O_3 , Eu_2O_3 and
12 combinations there.

1 2. A thermal barrier coating composition according to claim 1,
2 wherein the group A dopant is selected from the group consisting
3 of Sc_2O_3 , Yb_2O_3 , MgO , NiO , Cr_2O_3 , CoO , Fe_2O_3 , TiO_2 , RuO_2 , Ta_2O_5 , and
4 combinations thereof.

1 3. A thermal barrier coating composition according to claim 1,
2 wherein the group A dopant and the group B dopant are present in
3 the composition in substantially equal molar percentages.

1 4. A thermal barrier coating composition according to claim 1,
2 wherein the ratio of the molar percentages of group A dopant to
3 group B dopant is between about 1:8 and 8:1.

1 5. A thermal barrier coating composition according to claim 1,
2 wherein the ratio of the molar percentage of the primary
3 stabilizer to the sum of the molar percentages of the Group A
4 dopant and the Group B dopant is between 1:1 and 10:1.

1 6. A thermal barrier coating composition according to claim 1,
2 wherein the ionic radius of the group A dopant cation is smaller
3 than the ionic radius of the primary stabilizer oxide cation or
4 the base oxide cation.

1 7. A thermal barrier coating composition according to claim 1,
2 wherein the ionic radius of the group B dopant cation is larger
3 than the ionic radius of the primary stabilizer oxide cation or
4 the base oxide cation.

1 8. A thermal barrier coating composition comprising 46-97 molar
2 percent base oxide, 2-25 molar percent primary stabilizer, 0.5-
3 12.5 molar percent group A dopant, and 0.5-12.5 molar percent
4 group B dopant, said base oxide being selected from the group
5 consisting of ZrO_2 , HfO_2 and combinations thereof, said primary
6 stabilizer being selected from the group consisting of Y_2O_3 ,
7 Dy_2O_3 , and Er_2O_3 and combinations thereof, said group A dopant
8 being selected from the group consisting of rare earth oxides,
9 alkaline earth metal oxides, transition metal oxides and
10 combinations thereof, and said group B dopant being selected
11 from the group consisting of Nd_2O_3 , Sm_2O_3 , Gd_2O_3 , Eu_2O_3 and
12 combinations thereof.

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1 9. A thermal barrier coating composition according to claim 8,
2 wherein the group A dopant is selected from the group consisting
3 of Sc_2O_3 , Yb_2O_3 , MgO , NiO , Cr_2O_3 , CoO , Fe_2O_3 , TiO_2 , RuO_2 , Ta_2O_5 , and
4 combinations thereof.

1 10. A thermal barrier coating composition according to claim 8,
2 wherein the group A dopant and the group B dopant are present in
3 the composition in substantially equal molar percentages.

1 11. A thermal barrier coating composition according to claim 8,
2 wherein the ratio of the molar percentages of group A dopant to
3 group B dopant is between about 1:8 and 8:1.

1 12. A thermal barrier coating composition according to claim 8,
2 wherein the ratio of the molar percentage of the primary
3 stabilizer to the sum of the molar percentages of the Group A
4 dopant and the Group B dopant is between 1:1 and 10:1.

1 13. A thermal barrier coating composition according to claim 8,
2 wherein the ionic radius of the group A dopant cation is smaller
3 than the ionic radius of the primary stabilizer oxide cation or
4 the base oxide cation.

1 14. A thermal barrier coating composition according to claim 8,
2 wherein the ionic radius of the group B dopant cation is larger
3 than the ionic radius of the primary stabilizer oxide cation or
4 the base oxide cation.

1 15. A thermal barrier coating composition according to claim 8,
2 wherein the ionic radius of the group A dopant cation is smaller
3 than the ionic radius of the primary stabilizer oxide cation or
4 the base oxide cation, and the ionic radius of the group B
5 dopant cation is larger than the ionic radius of the primary
6 stabilizer oxide cation or the base oxide cation.

1 16. A thermal barrier coating composition comprising 46-97
2 molar percent base oxide, 2-25 molar percent primary stabilizer,
3 and 0.5-25 molar percent of a compound selected from the group
4 consisting of group A dopants and group B dopants, said base
5 oxide being selected from the group consisting of ZrO_2 , HfO_2 and
6 combinations thereof, said primary stabilizer being selected
7 from the group consisting of Y_2O_3 , Dy_2O_3 , and combinations
8 thereof, said group A dopant, if present, being selected from
9 the group consisting of rare earth oxides other than Er_2O_3 ,
10 alkaline earth metal oxides, transition metal oxides and
11 combinations thereof, and said group B dopant, if present, being
12 selected from the group consisting of Nd_2O_3 , Sm_2O_3 , Gd_2O_3 , Eu_2O_3
13 and combinations thereof.

1 17. A thermal barrier coating composition according to claim
2 16, wherein the group A dopant, if present, is selected from the
3 group consisting of Yb_2O_3 , Sc_2O_3 , MgO , NiO , Cr_2O_3 , CoO , Fe_2O_3 ,
4 TiO_2 , and RuO_2 .

1 18. A thermal barrier coating composition according to claim
2 16, wherein the ionic radius of the group A dopant cation, if
3 present, is smaller than the ionic radius of the primary
4 stabilizer oxide cation or the base oxide cation.

1 19. A thermal barrier coating composition according to claim
2 16, wherein the ionic radius of the group B dopant cation, if
3 present, is larger than the ionic radius of the primary
4 stabilizer oxide cation or the base oxide cation.

1 20. A thermal barrier coating composition according to claim
2 16, wherein the ratio of the molar percentage of the primary
3 stabilizer to the molar percentage of the Group A dopant or the
4 Group B dopant is between 1:1 and 10:1.